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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/853,217	05/11/2001	Douglas E. Weiss	55944USA9A.002	6357

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EXAMINER	
TSOY, ELENA	

ART UNIT	PAPER NUMBER
1762	

DATE MAILED: 02/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/853,217	WEISS ET AL.	
	Examiner	Art Unit	
	Elena Tsoy	1762	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 January 2005* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22* is/are pending in the application.

4a) Of the above claim(s) *18-22* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *2-5* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

Response to Amendment

Amendment filed on January 10, 2005 has been entered. Claims 1-22 are pending in the application. Claims 18-22 are withdrawn from consideration as directed to a non-elected invention.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Rejection of claims 1, 2, 6, 8, 16, 17 under 35 U.S.C. 102(b) as being anticipated by Mukohyama et al (US 4,886,840) has been withdrawn due to amendment.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. **Claims 1-17** are rejected under 35 U.S.C. 103(a) as being unpatentable over Weiss et al (WO 00/04055) in view of Loda (US 4,163,172), Mukohyama et al (US 4,886,840) and Botman et al (Nuclear Instruments and Methods in Physics Research B 139).

Weiss et al disclose a polymerization method comprising coating a substrate with an adhesive syrup (polymerizable composition) (See page 14, lines 15-25) and irradiating the

polymerizable composition with a beam of accelerated electrons at a temperature below 20^0C (See page 11, lines 1-12) to polymerize said polymerizable composition (See Abstract). The polymerizable composition comprises polymerizable C_8-C_{13}-alkyl acrylate monomers selected from the group consisting of isooctyl acrylate, 2-ethylhexyl acrylate, lauryl acrylate and tridecyl acrylate (See page 3, lines 27-32), a comonomer selected from the group consisting of acrylic acid, isobornyl acrylate, octylacrylamide and n-vinyl pyrrolidone (See page 7, lines 15-24), crosslinking agents (See page 8) and a thickening agent (See page 15, line 28). **The total dose** primarily affects the extent of conversion of monomer to polymer (See page 12, lines 19-22). High conversion of monomer to polymer (i.e., greater than 90%) may be achieved with 20-100 kGy over residence time of greater than 1 second (See page 4, lines 4-19) using any suitable method including a shuttle system communicating an **on-off** switch for the electron beam generator (See page 12, lines 1-3). The total doses of 20-100 kGy (20-1000 Mrad; **kGy =10 Mrad**, see page 12, lines 17-18) were achieved by varying dose rates of electron beam between 0.125-1 kGy/sec and timing the exposure (See pages 36, 37). Weiss et al further teach that superior adhesive properties can be achieved by *maintaining* the temperature of the adhesive syrup between $-80\ ^0$C and $10\ ^0$C (See page 11, lines 3-17).

Weiss et al fail to teach that the total dose for curing (polymerization) of electron beam curable coating is achieved using pulsed electron beam at a dose per pulse of about 10 to about 90 Gy (Claim 1) or about 10 to about 40 Gy (Claim 11) or of about 10 to about 30 Gy (Claim 13); a residence time of about 1.5 seconds to about 5 seconds (Claim 10), at a pulse rate equal to or greater than about 500 (Claim 1) or of 500 to about 3,000 pulses per second (Claim 12).

Loda teaches that polymerization is affected not only by the total dose of radiation, but also by the rate at which the dose is delivered: the high dose rate of very short electron beam

pulses, of the order of microseconds, elicits chemical reactions, which may be different from those produced by the impact of long pulses or continuous radiation (See column 1, lines 53-60). In other words, either pulsed electron beam or continuous electron beam can be used for curing (polymerization) electron beam curable compositions depending on particular application. Also, a secondary reference of Loda is relied upon to show that pulsed electron beam polymerization of an electron curable composition can be achieved by varying not only the total dose of radiation, but also varying dose per pulse, pulse length, thickness, etc. depending on a particular composition or intended use of a final product. As shown by Mukohyama et al, electron beam at a total dose of 0.75 Mrad - 3 Mrad (75 Gy –300 Gy) and a dose per pulse of 0.75 Mrad (75 Gy) (See column 10, lines 16-30) can be used for curing (polymerizing) 65 micron thick coating of an electron beam curable composition comprising a polyester acrylate or epoxy acrylate prepolymer, a difunctional acrylic monomer, acryloylmorpholine as a reactive diluent, requires. And, as shown by Botman et al, free radical polymerization of an acrylic monomer on seed latex can be achieved using pulses of accelerated electrons at dose per pulse of 0.92 Gy at pulse rate of 25 Hz (pulse per sec) with a total dose of 1700 Gy (See page 493, paragraph 4.2, column 2) or pulses of 50 Hz and 3 Gy per pulse (See Abstract); and homogeneous polymerization of styrene requires total dose of 6700 Gy at a pulse frequency of 25 Hz and dose per pulse of 2.3 Gy (See page 493, column 1, paragraph 4.2, lines 1-5). Botman et al also teach that the total dose depends on the overall irradiation time and the dose per pulse (at a given pulse rate) (See page 492, column 1, paragraph 3, lines 1-3).

Thus, the cited prior art shows that polymerization of an electron curable composition can be achieved by continuous electron beam or by pulsed electron beam.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used either continuous electron beam or pulsed electron beam for curing (polymerization) electron beam curable compositions in Weiss et al since Loda teaches that pulsed electron beam is functionally equivalent to continuous electron beam for curing (polymerization) electron beam curable compositions.

The cited prior art also shows that pulsed electron beam polymerization can be achieved by varying not only the total dose of radiation, but also varying dose per pulse (as shown by Loda), for example, from 0.92 Gy (as shown by Botman et al) to 75 Gy (as shown by Mukohyama et al). It is well known in the art that the total dose (D) depends on pulse frequency (F), dose per pulse (dpp) and residence time (t), i.e. $D = F \cdot dpp \cdot t$ or (dose rate) $\cdot$ t. Therefore, dose per pulse and residence time limitations are result-effective parameters in an electron beam curing (polymerization) process.

It is held that it is not inventive to discover the optimum or workable ranges of result-effective variables by routine experimentation. In re Antonie, 559 F.2d 618, 195 USPQ 6 (CCPA 1977). See also In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

It would have also been obvious to one of ordinary skill in the art at the time the invention was made to have determined the optimum values of the relevant dose per pulse parameters within a range of 0.92 Gy per pulse of Botman et al to 75 Gy per pulse of Mukohyama et al and the optimum values of the relevant residence time parameters (including those of claimed invention) in Weiss et al through routine experimentation depending on particular electron beam curable composition, thickness, etc., in the absence of a showing of criticality.

As to a pulse rate equal to or greater than about 500 or of 500 to about 3,000 pulses per second, since the total dose (D) depends on pulse frequency (F), dose per pulse (dpp) and residence time (t), i.e. $D = F \cdot dpp \cdot t$ or (dose rate) $\cdot$ t, the total doses of 100 kGy as in Weiss et al, for example, would be achieved at dose per pulse of 75 Gy (as shown by Mukohyama et al) and residence time of 1.5- 2 seconds with 889-667 pulses per second. At dose per pulse of e.g. 10 Gy, the same total doses of 100 kGy as in Weiss et al would be achieved with 667 pulses per second but at residence time of 15 sec.

It would have also been obvious to one of ordinary skill in the art at the time the invention was made to have determined the optimum values of the relevant pulses per second parameters including those within claimed range of 500-3,000 when used electron beams of 0.92 Gy per pulse of Botman et al to 75 Gy per pulse of Mukohyama et al and the optimum values of the relevant residence time parameters (including those of claimed invention) in Weiss et al through routine experimentation depending on particular electron beam curable composition, thickness, etc., in the absence of a showing of criticality.

As to claims 16, 17, it is the Examiner's position that the method of Weiss et al in view of Loda, Botman et al and Mukohyama et al would cure (polymerize) electron beam curable composition heterogeneously in a single phase since the method is substantially identical to that of claimed invention.

Response to Arguments

5. Applicants' arguments filed January 10, 2005 have been fully considered but they are not persuasive.

(A) Applicants argue that none of the references cited by the Examiner describe providing a pulse rate greater than or equal to about 500 pulses per second. The Examiner has

asserted that since total dose is a function of pulse frequency, dose per pulse and residence time it is not inventive to discover the optimum or workable ranges of result-effective variables by routine experimentation. However, there is nothing in the cited references that would indicate that the devices for generating e-beams described therein would even have been capable of providing pulse frequencies greater than or equal to 500 Hz. For example, the upper range described by Botman is 50 Hz, which is far below the 500 Hz recited in the present claims.

The Examiner respectfully disagrees with this argument. The cited references show that the total dose is critical to achieve polymerization. Loda, Botman and Mukohyama et al teach that the total dose can be achieved using varying dose rate, e.g., 0.92 Gy to 75 Gy, residence time, and frequency. For example, Weiss et al teach that for some applications, the total dose of 100 kGy over residence time of greater than 1 second is required. As shown by Botman et al, for free radical polymerization of an acrylic monomer on seed latex, the total dose of 1700 Gy is required which can be achieved using pulses at dose per pulse of 0.92 Gy at pulse rate of 25 Hz (pulse per sec) (See page 493, paragraph 4.2, column 2) or pulses of 50 Hz and 3 Gy per pulse (See Abstract). Thus, the upper range of 50 Hz, described by Botman, is required to achieve the total dose of only 1700 Gy. Clearly, one of ordinary skill in the art at would easily recognize that to achieve the total dose of 100,000 Gy for approximately the same residence time, much higher frequency, including over 500 Hz, should be used.

(B) Applicants assert that they have discovered that the manner in which the dose is delivered can have dramatic effect on the polymerization process itself: when the doge per pulse is relatively low (e.g.. about l 0 to about 90 Gy) and the pulse rate is below about 500 Hz, the reaction takes place predominantly in the homogeneous mode because of the longer time, and the frequency of above 500 Hz, the heterogeneous mode of polymerization becomes more dominant.

This surprising and unexpected discovery is not appreciated or otherwise disclosed anywhere in the art of record. It is a totally new, highly efficient and unexpected way to achieve, for example, the advantage of heterogeneous mode of polymerization in a single phase system.

The Examiner respectfully disagrees with this argument. First of all, it was discussed above, that Loda teaches that polymerization is affected not only by the total dose of radiation, but also by the rate at which the dose is delivered: the high dose rate of very short electron beam pulses, of the order of **microseconds** (high frequency of more than 500), elicits chemical reactions, which may be different from those produced by the impact of **long pulses** or continuous radiation (See column 1, lines 53-60). Therefore, the fact that the manner in which the dose is delivered can have dramatic effect on the polymerization process itself was well known in the art. Secondly, it is noted that the features upon which applicant relies (i.e., heterogeneous mode of polymerization in a single phase system versus homogeneous mode) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Conclusion

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

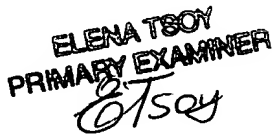
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after

the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Elena Tsoy whose telephone number is (571) 272-1429. The examiner can normally be reached on Mo-Thur. 9:00-7:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive Beck can be reached on (571) 272-1415. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Elena Tsoy
Examiner
Art Unit 1762

February 8, 2005